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107E-6052-05
November 11, 2005

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Missouri Department of Natural Resources
P.O. Box 176
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BOEING

RE: Boeing Resource Conservation and Recovery Act Risk-Based Corrective Action (RBCA) Report Dated September 2004, Hazelwood, Missouri, Permit # MOD00818963

Dear Ms. Bruss:

The purpose of this letter is to provide the Missouri Department of Natural Resources Hazardous Waste Program with our response to your September 22, 2005, comments on the Boeing Risk-Based Corrective Action Report. It is important to Boeing that we bring the Boeing risk assessment information to conclusion to allow us to complete the Corrective Measures Study document for this site. Therefore, we are providing this letter in draft form and would appreciate the opportunity to meet with you prior to finalizing the attachments discussed in our comments.

General Comments:

1) The HWP reiterates that there are still several areas where the extent of contamination is not completely defined to the Investigative Threshold Levels specified in the Resource Conservation and Recovery Act Facility Investigation Work Plan. The HWP does agree with Boeing's position that the extent of contamination is adequately defined for the purpose of Risk Assessment. As has been previously discussed between the HWP and Boeing, additional contaminant extent delineation may be necessary in some areas as part of the corrective measures study process.

Response:

Section 6.10 of draft Departmental MRBCA Technical Guidance (Feb. 2005) states "The key issue related to the delineation of impacts is the concentration levels to which impacts are defined. Several alternatives are available. Examples include but are not limited to: background levels, drinking water levels, generic screening levels, site-specific screening levels, or non-detect levels."

The ITLs specified in the RCRA facility investigation reports are a combination of target levels in CALM and Region IX PRGs. Since MRBCA replaces CALM, we believe the ITLs should also be replaced in that delineation is necessary to MRBCA levels.

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Despite the above, if MDNR requests additional delineation we would like to know specifically the (i) areas, (ii) media, (iii) specific chemicals, (iv) specific levels to which MDNR desires delineation, and v) the reason for additional delineation. Once we have received the detailed information, we can further evaluate your comment and respond accordingly

We understand that the overall objective of site characterization is to protect human health and the environment. If characterization is calculate risk (as stated in your comment) why is additional delineation necessary?

2) Comments recently received from the United States Environmental Protection Agency (EPA) on the draft Missouri Risk Based Corrective Action (MRBCA) guidance document have expressed concerns regarding certain exposure factors specified in the version of the MRBCA guidance used to prepare the Boeing Risk Assessment. The MRBCA guidance is currently being revised to address EPA's comments. Please update this Risk Assessment with all the current agreed upon values as appropriate.

Response:

Our understanding of MDNR's response to EPA's comment is that the following exposure factors have been changed:

- *Skin surface area,*
- *Soil adherence factor, and*
- *Inhalation rate for construction worker.*

A few additional exposure factors have changed due to the adoption of RAGS Part E for the evaluation of dermal exposures.

Refer to Table 1 of Attachment 1 that lists the factors that were used in the Boeing risk assessment relative to the factors that were changed.

MDNR has not accepted other proposed changes. The effect of these factors is as follows:

Skin surface area and soil adherence factors: Both these factors will reduce the exposure and risk due to soil contact for all receptors.
Inhalation rate for construction worker: This will increase the inhalation risk for construction worker. However, for construction worker risk from ingestion and dermal contact with soil will reduce. The combined effect of these changes for selected chemicals is shown in the attached Table 2 for Attachment 1.

Since the combined effect of these factors may not change the overall risk management decision, it may not be cost effective or necessary to revise the entire risk assessment.

It is conceivable that MDNR, EPA, or advances in our knowledge of exposure factors may in the future change other exposure factors. It is not appropriate for MDNR to require revisions to previously submitted risk assessments. If this is the case, projects would never reach satisfactory conclusions, but will remain in a state of perpetual revisions.

3) Representative Concentrations – For Areas 2B, 3C, and 6B, the maximum concentration exceeded ten times the average concentration for several of the constituents. An explanation was given that since the target levels were detected at orders of magnitude lower than the acceptable HQ of 1, and acceptable IELCR of $1x10^{-5}$, the target risk the constituents would not exceed unacceptable levels. To be conservative, the constituents whose concentrations are within two orders of magnitude of acceptable risks were identified. However, no additional explanation of exceedance of the ten times ratio is provided. The draft MRBCA guidance says that if the ratio exceeds 10, then the following could be occurring:

- The maximum concentration is an outlier,
- The average concentration was inaccurately calculated,
- The site is not adequately characterized, or
- A hot spot may not have been adequately characterized.

Please discuss further the possible reasons for the ratio exceedance, and discuss what, if any, implications this has for the calculation of representative concentrations and/or risk-based decision-making for the constituents whose concentrations were within two orders of magnitude of acceptable risk.

Response:

The reason for the factor of 10 check is to confirm that the calculated risk, which is based on certain assumptions regarding the distribution of chemicals and the arithmetic average concentrations over the exposure domain, does not exceed the target risk level. In cases where the calculated risk based on averages is "close to" the target risk, considerable effort may be necessary to evaluate and explain the exceedence in this ratio because in such cases an "error in calculation of the representative concentration or insufficient site characterization" may cause the target risk to be exceeded. In such cases the MRBCA guidance document lists several factors that may help in the evaluation. However, in cases where the calculated risk using the average concentration is several orders of magnitude lower than acceptable risk and there are no obvious errors in risk characterization, it is not necessary to spend the time and effort required to explain the ratio of 10, because the likelihood of exceeding the target risk is negligible.

4) Representative Concentrations - The report states that representative concentrations refers to the arithmetic mean. The MRBCA guidance states that "In certain cases, an area-weighted average may be a better estimate of the representative concentration. If a gridded sampling pattern has been used to sample soil, the arithmetic average is a good approximation of the area-weighted average. However, if a biased sampling pattern has been used, then it may be necessary to use an area-weighted average to accurately determine the representative concentration. Prior to performing the area-weighted average, the remediating party should discuss the specifics with the project manager."

The EPA has issued several guidance documents to supplement its Risk Assessment Guidance for Superfund (RAGS). Supplemental Guidance to RAGS: Calculating the Concentration Term (May 1992), and Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites (December 2002) are two such documents intended to assist assessors in calculating the representative concentrations of chemicals at impacted sites. According to the above documents, before a statistical method is used to determine a representative concentration, the EPA recommends evaluating the data to determine if statistical methods are appropriate.

The HWP recognizes that an arithmetic average approach to calculating representative concentrations within areas of impact was previously agreed to in discussions with Boeing, with the caveat that any post-remediation sampling to demonstrate that clean-up goals have been met may need to be done on an area-weighted average basis. Further, certain of EPA's recent comments on the draft

MRBCA guidance document have expressed concerns about MRBCA's deviation from the 95 percent upper confidence limit approach to calculating representative concentrations as contained in some EPA guidance including RAGS. The HWP therefore requests, in accordance with the above-referenced documents, that an evaluation of the data to determine which statistical methods are appropriate be included in the Risk Assessment. It could also be beneficial to conduct a focused sensitivity analysis for one or more impacted areas to assess the differences in calculating the representative concentrations by arithmetic average, area-weighted average, and 95 percent upper confidence limit approaches to demonstrate that the conclusions derived from these methods do or do not vary significantly and thereby form the basis for moving forward with an appropriate methodology.

Response:

We agree with MDNR's comment that (i) there are many different ways to estimate representative concentrations, and (ii) EPA's preference is to use the 95% UCL. In MDNR's response to EPA's comment, MDNR has reaffirmed their intention to use the representative concentrations as described in the Feb. 2005 version of Departmental MRBCA Technical Guidance.

It is important to remember that the factor of 10 discussed in Comment No. 3 is an added "safety factor" within the MRBCA program that ensures risk would not be significantly underestimated.

Based on the above, we agree to work with MDNR to define the best approach to estimate the representative concentrations for post-remediation samples. Thus, the soil samples collected as a part of the interim remedial measures will be used to perform this sensitivity analysis and to confirm that remediation is complete. A separate stand alone report/addendum will be submitted.

Even before performing the sensitivity analysis, it can be stated that the calculated risk using different representative concentrations will be different. The absolute difference between these estimates will depend on the underlying statistical distribution of the data. For concentration distributions with large coefficient of variance the difference between the 95% UCL and the arithmetic average will be larger than for distributions with small coefficient of variance. Consequently the difference in risk estimate will be larger. After the sensitivity analysis has been performed, how will MDNR decide which risk estimate is correct? What are the specific criteria that MDNR will use? If the criteria are that higher risk estimates are better then this is a futile exercise.

Therefore, prior to Boeing performing this sensitivity analysis, we request MDNR to provide the criteria they will use to evaluate the results of the sensitivity analysis.

5) For the ecological risk pathway, discharge to Coldwater Creek, additional evaluation of potential impacts to Coldwater Creek was given in a Risk Assessment Addendum, dated November 2004. Please include this addendum as part of the Revised Risk Assessment. This addendum does address the classification of Coldwater Creek, and comes up with an allowable concentration for the stream, and addresses possible impacts from Area 6D. It does not address possible long-term impacts from other source areas on the Boeing site. The ecological Risk Assessment screening checklist which is included in each area, states that contaminants at the site are mobile in the groundwater, and do eventually discharge to Coldwater Creek. However, in each of the sections, the next question states that discharge of contaminants to the creek is unlikely based on the distance to the creek. While this is most likely true in contaminated areas which are located further from Coldwater Creek, allowable concentrations should be figured at 1000 ft and 2000 ft distances, in addition to the 75 ft calculation which was referenced in the addendum.

Response:

Once all the comments have been addressed and MDNR is satisfied with the risks, Boeing will generate the final updated risk document. At that point we will incorporate the addendum into the risk assessment.

Meanwhile, Boeing will perform the following:

(i) Extend the distance to 2,000 ft, i.e., back-calculate allowable concentration over a much longer distance. (See Attachment 2)
(ii) Demonstrate that the plume is stable. (See Attachment 3)
(iii) Develop a monitoring plan to confirm plume stability, if the existing data is not sufficient. (See Attachment 3)

6) An important component of a Risk Assessment is a discussion of uncertainty. The MRBCA document states that "A discussion of the variability and uncertainty in the input parameters and the manner in which the impact of this variability on the final risk will be evaluated uncertainty analysis techniques range from sensitivity analysis to detailed Monte Carlo simulations." Please include an uncertainty analysis in the revised report.

Response:

Is it MDNR's comment/request to include a generic section on uncertainty analysis? If so, we will include such an addendum to the risk assessment report. It is important to note that in general, the inputs used to estimate risk are conservative and the estimated risk is a conservative estimate. We can include supporting arguments and explanations to this effect.

We have prepared Attachment 4 in response to this request. Based on your review and approval of this attachment, we will incorporate it into the final risk assessment. It is important to note that overall the impacts and the methodology used is conservative and the estimated risk represent a high end estimate of risk.

7) Human Consumption of groundwater pathway. The Risk Assessment Addendum states that there will be activity and use limitations (AULs) placed on all affected properties. Please note that if a property owner refuses to put an AUL on their property, or a general city, or county ordinance on well restrictions is not in place at the time of finalizing the Risk Management Plan, the Risk Assessment may need further revision to assess the future domestic use of groundwater as a potentially complete pathway. If the well information source utilized to assess existing groundwater use in the vicinity of the site was obtained from the DNR's Geological Survey and Resource Assessment Division (GSRAD), these records are typically only complete for wells post-dating 1986. Industries and/or individuals in the area could be using groundwater for industrial or domestic purposes and not be listed in the GSRAD database. In order to further document current groundwater use in the area, the Risk Assessment needs to contain a discussion of sources of data used to compile surrounding well data. If the GSRAD database is the only source of the data, then a survey of neighboring businesses and contact with local public water supply agencies should be conducted to find out if their records document any existing wells and/or anyone refusing to hook up to the public water supply. This step could possibly be eliminated if a city or county ordinance was in place restricting groundwater use in the area and/or mandating connection to the public water supply.

Response:

AULs will be put into place for Boeing owned portion of the site and will be negotiated with non-Boeing owned portion of the site.

Section 1.10 of our risk assessment report discusses the water well survey. In addition to this, a water well survey was performed by EDR using the (i) Federal USGS

database, (ii) Federal FRDS PWS database, and (iii) State database (June 2003). A copy of the EDR report is included as Attachment 5. Based on this survey, five private wells were identified within a 2-mile radius of the site. One well is within a 1-mile radius of the site and this well was installed to a depth of 44 feet. The results are consistent with the discussion in Section 1.10 of the risk assessment report.

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8) In general, the assumptions used to rule a pathway incomplete lack an acknowledgment that AULs will be needed to ensure that these assumptions remain true over the long term. For example, most areas consider dermal contact with surficial soil as an incomplete pathway, because the site is almost entirely paved, and this condition is reasonably anticipated to remain the same in the future. While the HWP does not fundamentally disagree with this conclusion, this assumption cannot be made in the context of a long-term risk management plan without some sort of AUL (e.g., placement of a land-use restriction requiring the property to remain paved, provisions in the facility permit or in a restrictive covenant that require prior approval of the DNR for pavement removal or disturbance of underlying soil). In addition, for Areas 2A, 2B, and 2C, the report states that future use of the property is unknown, so conservatively, it was assumed a building would be constructed. If future land use is unknown, to be conservative, then it should be assumed that the property might not remain paved in the future. If this conservative assumption is made then the surficial soil pathway would be complete and dermal contact and ingestion of surficial soil would need to be addressed in the Risk Assessment. In short, without some durable AULs, future use assumptions which cannot exclude dermal contact with surficial soil and ingestion of surficial soils for each of the areas and sub-areas cannot be assured.

Areas where future building construction is assumed should either be assessed by evaluating a building with a basement scenario or specify that there will be AULs put in place to prevent the construction of buildings with basements over areas with potential future indoor air concerns. Perhaps an even better option would be to include a sensitivity analysis in the Risk Assessment which compares the building on-grade with a basement scenario over an area of the site with "worst case" implications for indoor air. As with the sensitivity analysis for representative concentrations outlined above, such an analysis would demonstrate that the conclusions derived from these scenarios do or do not vary significantly, thereby forming the basis for moving forward with an appropriate scenario across the site.

The HWP realizes that AULs are anticipated to be proposed in the Risk Management Plan, but initial planning needs to be done at this stage. The Risk Assessment needs to explicitly state what AULs are planned for each of the areas to ensure that the long-term risk assessment assumptions are met.

Response:

Following are several observations:

(i) The site is located in a very busy commercial area on and adjacent to a major airport and the possibility of large areas remaining unpaved for a long period of time is unrealistic.

(ii) Consideration of indoor inhalation pathway is significantly more conservative than evaluating the direct contact with soil pathway for volatile organics.

(iii) Buildings with basements do not necessarily result in a more conservation target levels than buildings without basements. This is so because buildings with basements would typically have twice the indoor air volume in which any emissions would mix. To demonstrate this Boeing will perform a sensitivity analysis for building with and without the basement for the SWMU 17 using the post interim remediation concentrations (See Attachment 6).

9) MDHSS does not recommend the use of 0.833m3/hour as an initial review for the construction worker scenario for BT1S. For evaluating inhalation exposure to construction worker, DNR proposed at the August 23, 2005, meeting the following parameters for the construction worker:

- Inhalation rate: 1.8 m^3/hr
- Exposure time: 10 hrs/day

The HWP requests that these parameters be used in a sensitivity analysis.

Response:

As discussed in response to Comment No. 2, MDNR is currently proposing the following exposure factors for the construction worker:

- *Skin surface area,*
- *Soil adherence factor, and*
- *Inhalation rate for construction worker.*

As we discussed during the August 30, 2005 meeting, Boeing will perform a sensitivity analysis using SWMU 17 data (See Attachment 7).

Specific Comments:

1) Section 1.9, *Exposure Assessment,* does not discuss future land use for the facility. Instead, discussion is deferred to area-specific sections. According to EPA, RAGS, Part A, Section 6.2.2, an exposure assessment should characterize future land use. The HWP would suggest simply including language in Section 1.9 in the form of a general discussion related to future site-wide land use, and then refer readers to area-specific sections for more detail.

Human health-risk calculations for the residential scenario within the area-specific sections appear to be based upon inadequate substantiating evidence that land-use restrictions exist for many of the areas. Without such evidence, the possibility of residential exposure should be considered. The draft MRBCA guidance calls for documentation of ordinances, development plans, and zoning and/or AULs as supplemental evidence supporting future land use assumptions.

Response:

Boeing will add the language provided in Attachment 8 regarding future land use.

It is our understanding that Boeing is working with the relevant stakeholders to develop AUL language that will ensure long-term non-residential land use of the area. Hence, it is appropriate to consider future land use as non-residential.

2) Section 1.9.1, discusses how the facility is separated into discrete areas and sub-areas to increase homogeneity, in terms of risk and exposure factors as well as for the development of target clean-up levels. This section of the document should also discuss the relative stability of the contamination in both soil and groundwater to justify the appropriateness of the "discretization." This section should also discuss potential changes that could occur in the risk estimates due to the migration of contaminants from one discrete area of the site to another. Please include a discussion regarding plume/contaminant stability and how this might affect the risk calculations.

Response:

Boeing will review the groundwater concentrations across the site and discuss plume stability. For each area, Boeing will evaluate the potential for chemicals to migrate on to it from adjacent upgradient areas. Also refer to Attachment 3 on plume stability.

3) Section 1.9.2.2, of this assessment discusses comparing maximum contaminant concentrations detected for metals in each of the areas/sub-areas to background levels. MDHSS recommends that constituents not be eliminated from risk calculations simply because they are attributed to background. Such screening could result in the loss of important risk information for those potentially exposed, even though cleanup may or may not eliminate a source of risks caused by background levels. MDHSS recommends a baseline Risk Assessment approach, consistent with Guidance for Comparing Background and Chemical Concentrations in Soil for Comprehensive Environmental Response, Compensation and Liability Act sites (OSWER 9285.7-41) and Role of Background in the Comprehensive Environmental Response, Compensation and Liability Act Cleanup Program (OSWER 9285.6-07P) that retains constituents that exceed risk-based screening concentrations. This approach involves addressing site-specific background issues at the end of the Risk Assessment, in the risk characterization. Therefore, we would recommend RAM include two sets of calculations, one set that includes the total hazard index and target risk with all contaminants of concern (COC), and another set that includes total hazard index and target risk with all COC minus those considered background.

Response:

Boeing believes it is not necessary to include metals below background concentrations in the risk calculations for the following reasons:

(i) At the site, the primary "risk driver" is the indoor vapor intrusion of volatile chemicals from soil and groundwater. Metals are not volatile and hence will not change the overall risk management decision.
(ii) Metals are not very mobile and there are no significant metal plumes.

Besides the effort required to generate two sets of calculations by Boeing and the effort required by MDNR to review the two sets is not commensurate with the benefits.

4) Section 1.9.2.3, discusses laboratory-qualified data and states that all detectable concentrations, including such qualified data, are typically used in the assessment. *Risk Assessment Guidance for Superfund: Volume 1 – Human Health Evaluation Manual, Part A.* (EPA/540/1-89/002) and *Guidance for Data Usability in Risk Assessment, Part A* (OSWER Directive 9285.7-09A) discuss screening data from consideration when blanks are contaminated with detected chemicals. The text is unclear how qualified data will be specifically used in the assessment. MDHSS recommends that this discussion be broadened.

Response:

Boeing will include additional discussion in Section 1.9.2.3 (Refer to Attachment 9). In general, the assumptions used in the risk assessment related to laboratory qualified data are conservative.

5) Section 1.9.5, discusses the toxicological values used to assess toxicity to the site COC. Toxicity values are first selected from the DNR document *Cleanup Levels for Missouri (CALM).* Alternative sources of toxicity values include the EPA *Region IX Preliminary Remediation Goals* and the Texas Risk Reduction Program. MDHSS recommends that the hierarchy of toxicity value sources set forth by *Human Health Toxicity Values in Superfund Risk Assessments* (OSWER No. 9285.7-75) be reviewed to ensure the use of the most recent and defensible toxicological data in the assessment. MDHSS recommends that the Provisional Peer Reviewed Toxicity Values for Superfund *Derivation Support Document for Total Petroleum Hydrocarbons* (TPH) (SRC SF 01-031/10-16-2002) be utilized when considering TPH in a Risk Assessment.

Response:

Attachment 10 includes the list of chemicals for which MDNR has agreed to change the toxicity values in relation to the Feb. 2005 version.

At the time the risk assessment was performed, toxicity values were obtained from reliable publicly available sources acceptable to MDNR. It is not reasonable to request reevaluation if a few toxicity values are changed by EPA. If MDNR adheres to this policy, risk assessments for sites in Missouri will have to be continuously revised. For our future cases related to the development of target levels are demonstration that cleanup is complete, Boeing will use updated/most current toxicological values.

6) Section 1.9.6, discusses the exposure factor values used to assess the site COC. Exposure factor values are first selected from the DNR document Clean-up Action Levels Missouri. MDHSS recommends that the sources of each exposure value be cited and justified. The source list in Table 1-7, *Exposure Factors Used to Estimate Risk*, should be updated accordingly.

Response:

Table 1-7 has been revised to include the source of the exposure factors and is attached as Attachment 11.

7) Section 1.9.7, *Fate and Transport Models.* The volatilization factor and particulate emission factor (PEF) equations presented in the RBCA Report are from the 1996 *Soil Screening Guidance: Technical Background Document* and are intended for residential and commercial/industrial scenarios with chronic exposure. EPA's *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites* (SSL) (December 2002) provides separate equations for construction worker scenarios with subchronic exposure.

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Specifically, the volatilization factor equation for the construction worker assumes that excavation during construction can increase volatile emissions by unearthing soil contamination and bringing it into direct contact with the air, which increases the flux of volatile contaminants from the soil into the air. The PEF for the residential and commercial/industrial scenarios is based on fugitive dusts generated by wind erosion, while the construction worker scenario incorporates a PEF based on emissions from truck traffic on unpaved roads, which typically contribute the majority of dust emissions during construction activities. Furthermore, the SSL guidance provides separate equations for calculating the dispersion factor for dust (denoted as the Q/C variable) for chronic and subchronic exposures. Please refer to Chapter 5 and Appendices D and E of the 2002 SSL guidance for detailed information on the calculation of these factors specific to the construction worker scenario.

We suggest that RAM reference these new models and make adjustments to their calculations. We have found that there are significant differences between the 1996 model and the 2002 model when calculating volatilization factors and particulate emission factors.

Response:

The method used by Boeing to estimate the particulate emissions and risks for the construction worker are consistent with the approach in the MRBCA program. Also we are aware of MDNR's discussion regarding the consideration of subchronic exposures. See note below from the MRBCA Document (August 24, 2005):

"Use of toxicity values different than the values listed in Appendix E, Table E-1, and may include the use of subchronic toxicity values for non-carcinogenic effects when the exposure duration is less than seven years. (Note that subchronic toxicity values are not as widely available as chronic values, and unlike chronic reference dose values (RfDs) and reference dose concentration values (RfCs), no EPA work group exists to review and verify subchronic RfDs or RfCs. Subchronic toxicity values for a limited number of compounds are available from EPA's Health Effects Assessment

Summary Tables (HEAST). The Agency for Toxic Substances and Disease Registry (ATSDR) publishes Minimal Risk Levels (MRLs) that may be suitable for use as subchronic toxicity values)."

Boeing has not used subchronic toxicity values because:

- *Subchronic toxicity values are not available for most of the chemicals.*
- *Use of subchronic values is less conservative than the use of chronic values.*

We have reviewed the models presented in the Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (USEPA, December 2002) for the estimation of particulate emissions at construction sites. These models require several inputs whose reasonable values are virtually impossible to estimate. Examples include:

- *Mean vehicle weight (tons), and*
- *Sum of fleet vehicle kilometers traveled during construction.*

Depending on the values used for the above parameters, widely different results are possible. If MDNR were to provide us with reasonable values for these parameters, we will be able to perform some sensitivity analysis. Absent this, we believe the approach followed by Boeing is reasonable and appropriate.

8) Section 1.9.10., *Consideration of TPH in the Risk Assessment*. The TPH results by the Texas Method 1006/05 are not as transparent as the EPA Solid Waste Method 8260. We suggest more discussion detailing the differences, if any, between the two methods.

Response:

The use of Texas method at this site was discussed with MDNR and MDNR's laboratory Mr. Curt Lueckenhoff. Further details of the Texas method are readily available at http://www.tceq.state.tx.us/remediation/analysis.html, and it is promulgated by a regulatory agency. USEPA does not have an equivalent method for the fractionation of TPH.

9) Section 1.9.11, discusses how lead will be considered in the assessment. The references used for the lead methodology are outdated. Please see the following website for updated versions: http://www.epa.gov/superfund/programs/lead/products.htm. On the aforementioned website, the Integrated Exposure Uptake Biokinetic Model for Lead in Children, Windows® version (IEUBK win v1.0 build 261) *Recommendations Of The*

Technical Review Workgroup For Lead For An Approach To Assessing Risks Associated With Adult Exposure To Lead In Soil (OSWER #9285.7-54) and the EPA Adult Lead Methodology spreadsheet (Calculation of preliminary remediation goals (PRGs), Appendix B of Adult Lead Methodology Guidance (OSWER Dir #9285.7-54) are available. This website should be routinely checked to obtain the latest guidance from the EPA Technical Review Workgroup.

Section 1.9.11., EPA's *Blood Lead Concentrations of U.S. Adult Females: Summary Statistics from Phases 1 and 2 of the National Health And Nutrition Evaluation Survey (NHANES III)* page 7 has recommendations for lead PRGs based on new information on race/ethnicity-specific geometric standard deviation of blood lead concentration values. The range of the PRG has not changed considerably. For all regions, the PRG is 794-1,288 parts per million.

Response:

Boeing's evaluation of lead is consistent with the methodology presented in the draft Departmental MRBCA Technical Guidance. However, we have noted your comment for future reference.

10) In Table 1-5, *Physical/Chemical Properties for Potential Constituents of Concern*, RAM needs to disclose the source of the physical and chemical properties for the potential constituents of concern.

Response:

Section 1.9.4 discusses the sources and it is consistent with the MRBCA Guidance. At this point, Boeing does not intend to give source for each and every number in the table.

11) In Table 1-6, *Toxicological Properties for Potential Constituents of Concern*, RAM includes a relative absorption factor used for adjusting toxicity values from administered dose to absorbed dose. RAM should verify that the only toxicity values adjusted are those based upon administered dose, not absorbed dose.

Response:

The values for adsorption factor used are consistent with the MRBCA process. Generally, oral toxicity values are based on administered dose.

12) Section 1.9.5, *Toxicological Properties*, Table 1-6 has some older toxicity values for vinyl chloride. Multiple values in EPA's integrated risk information system include oral slope factor values of 7.2×10^{-1} per mg/kg-day (linearized multistage model (LMS)) and 7.5×10^{-1} per mg/kg-day (LED 10/linear method (LED 10) for continuous lifetime exposure during adulthood and 1.4 per mg/kg-day LMS and 1.5 per mg/kg-day LED 10 for continuous exposure from birth. According to integrated risk information system, the use of either of the toxicity values based upon the LED/10 or LMS modeling produce virtually identical results; MDHSS will accept either value but would prefer the more conservative LMS value.

Response:

Since this is a non-residential site, exposure is likely only during the working stages of a person's life. Hence values for continuous exposure from birth toxicity are not relevant. There is practically no difference in the risk calculation if a value of 0.72 $(mg/kg\text{-}d)^{-1}$ or 0.75 $(mg/kg\text{-}d)^{-1}$ is used.

13) In Table 1-8, *Fate and Transport Parameter Used to Estimate Risk*, under the column heading *Comment*, RAM references the "MDNR Default." What is the Missouri DNR source that is referenced?

Response:

The Missouri DNR source is MDNR Preliminary Draft Process Document (June 2003) and MRBCA Process for Petroleum Storage Tanks (February 2004).

14) Section 3.3.2, *Future Land Use,* states that it is not known whether a building will be constructed in Area 2, so it was conservatively assumed that a building would be constructed with no basement. To rule out the possibility of a basement, a land-use restriction needs to be in place restricting construction of a basement. Without this restriction, the calculations should be assuming a basement would be constructed in order to be truly conservative.

Response:

As stated earlier in our response to General Comment No. 8, a building with a basement does not necessarily result in higher risk compared with a building without a basement. To confirm this further Boeing will perform sensitivity analysis with the SWMU 17 data. The results are presented in Attachment 6.

15) Section 3.6, *Free Product,* the RBCA guidance states that for wells that contain or have contained free product within the most recent two years, the concentration representative of the well should be the effective solubility of the various chemicals representing the free product in the well. Monitoring wells 9S, 10S, TP-6, A10, and A13 all have had free product within the most recent two years of sampling data. Even though sheen is not a measurable amount, it is still indicative that free-phase contaminants exist in the subsurface. For each of these wells, the concentration used in the risk calculations needs to be the effective solubility of the free product.

Also, this section states that benzene, toluene, ethylbenzene, xylene concentrations have shown a decreasing trend, therefore, there is no evidence of an expanding dissolved phase plume. Graphs of the benzene, toluene, ethylbenzene, xylene concentrations at MW-A13 are included in Figure 3-3; however, these are not sufficient to conclude that a decreasing trend has been established. A more in-depth discussion is needed with supporting data to conclude that a decreasing trend, and therefore, non-expanding plume exists. Also, the most recent data on the graphs is from January 1999. In addition to the discussion of the possible trends, more recent sampling data is needed to justify the argument as well. Further support for any future plume stability determinations should focus more holistically on the entire downgradient perimeter of the plume and demonstrate that, on the whole, concentrations at the horizontal and vertical perimeter of the plume(s) are not increasing. This should be done in addition to tracking contaminant trends in specific wells.

Response:

Refer to our response to Specific Comment No. 2.

16) Section 3.8.2, *Sub-area 2B,* second paragraph refers to Tables 3B-11(a) and 3B-11(b), which cannot be located in our document. Are the tables referred to meant to be 3B-12(a) and 3B-12(b)?

Response:

Yes. Tables 3B-11(a) and 3B-11(b) should be Tables 3B-12(a) and 3B-12(b).

17) Section 3, Table 3A-10(a), *Soil Constituents of Concern Summary of Non-Residential Worker for Sub-area 2A: Demolished Area.* The Average Concentration for Benzene, Ethylbenzene, and TPH ORO are all higher than the Max Detected for these parameters. Please explain how the average could be higher than the Max Detected.

Response:

In calculating the average concentration, the non-detect values were replaced with half the detection limit. So if the detection limit exceeds the highest detected value, the average can exceed maximum detected value.

BOEING

18) Section 4.3.1, *Current Land Use,* mentions that buildings 1, 2, and 4 contain basements. It is unclear if the basements were figured into the risk calculations, please clarify.

Response:

Basements were included in the analysis. Also refer to response to General Comment No. 8.

Sincerely,

Joe Haake

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cc: Rich Nussbaum, MDNR, HWP
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